



Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

PRESCRIBED GRAZING

CODE 528

(ac)

DEFINITION

Managing the harvest of vegetation with grazing and/or browsing animals with the intent to achieve specific ecological, economic, and management objectives.

PURPOSE

Apply this practice as a part of a conservation management system to achieve one or more of the following—

- Improve or maintain desired species composition, structure and/or vigor of plant communities
- Improve or maintain quantity and/or quality of forage for grazing and browsing animals' health and productivity
- Improve or maintain surface and/or subsurface water quality and/or quantity
- Improve or maintain riparian and/or watershed function
- Reduce soil erosion, and maintain or improve soil health
- Improve or maintain the quantity, quality, or connectivity of food and/or cover available for wildlife
- Manage fine fuel loads to achieve desired conditions

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where grazing and/or browsing animals are managed.

CRITERIA

General Criteria Applicable to All Purposes

Manage stocking rates and grazing periods to adjust the intensity, frequency, timing, duration, and distribution of grazing and/or browsing to meet the planned objectives for the plant communities, and the associated resources, including the grazing and/or browsing animals.

Remove forage in accordance with site production limitations, rate of plant growth, the physiological needs of forage plants, and the nutritional needs of the animals. Refer to Kentucky NRCS "GRAZE.xls" spreadsheet for detailed guidance.

Provide desired grazed/browsed plants sufficient recovery time from grazing/browsing to meet planned objectives. The recovery period can be provided for part or all of the growing season of key plants. Deferment and/or rest will be planned for critical periods of plant or animal needs.

Manage livestock movements based on rate of plant growth, available forage, and identified objectives such as utilization, plant height or standing biomass, residual dry matter, and/or animal performance. Refer to tables 1, 2 and 3 of this standard.

Manage grazing and/or browsing animals to maintain adequate vegetative cover on sensitive areas (i.e., riparian, wetland, habitats of concern, and karst areas).

Provide adequate quantity and quality of drinking water during period of occupancy.

Develop contingency plans to deal with expected episodic disturbance events (e.g., drought, wildfire, insect infestation, etc.).

Develop monitoring plans that directly support adaptive management decisions based upon identified ecologic triggers and thresholds to optimize the conservation outcome for the selected purposes.

Conform to all applicable Federal, State, Tribal and local laws. Seek measures to avoid adverse effects to endangered, threatened, and candidate species and their habitats.

Additional Criteria to Improve or Maintain the Health and Vigor of Desired Plant Communities

Base the intensity, frequency, timing, and duration of grazing and/or browsing on desired plant health, expected productivity, and composition of key species to meet management objectives.

Plan periodic deferment from grazing and/or browsing to maintain or restore the desired plant community following grazing/browsing and episodic events, such as wildfire or severe drought.

Where appropriate, test soil periodically for nutrient status and soil reaction, and apply fertilizer and/or soil amendments according to soil test results to improve or maintain plant vigor

Prescribed grazing schedules will be developed to serve as initial guides. Grazing cycles should be adjusted so as to ensure that enough pastures are available in grazing system to allow for adequate forage regrowth periods. The regrowth period is usually 15-21 days in spring and early summer and 30-42 days in the late summer and fall.

TABLE 1: DRY MATTER (Pounds per acre inch) Based on Levels of Management

Key Species	Avg Mgt Level (Lbs) <i>1/</i>	Low to High Mgt Level (Range) (Lbs) <i>2/</i>
Alfalfa/Alfalfa & Grass	200	75-300
Bermudagrass	250	100-300
Kentucky Bluegrass	160	100-275
Native Warm Season Grasses	100	50-250
Orchardgrass	180	75-300
Orchardgrass/certified Red Clover	225	100-400
Orchardgrass/legumes	200	100-325
Red Clover	220	100-300
Tall Fescue	210	100-350
Tall Fescue/certified Red Clover	210	100-375
Tall Fescue/legumes	200	80-325
Tall Fescue + 90 N (split)	210	10-350
Tall Fescue/Orchardgrass/Bluegrass/legume	200	100-400
Small Grain	150	75-250
Ryegrass	250	75-400

1/ The values should only be used as guides. They represent estimated average values taken from many sources across the region from thick, well fertilized, actively growing plant stands that typically result from

an average level of management. 2/ These values should only be used as guides. They represent an estimated average range of values taken from many sources across the region. The range (spectrum) begins with plant stands resulting from low management levels which are typically characterized by thin, not fertilized, often overgrazed stands to the highly intensive management level which represents thick stands with rapid growth and high yield.

TABLE 2: Harvest Efficiency of Pastures with Different Grazing Strategies

Method	^{1/} % Utilization
Strip grazing	75-80
Rotation two times/day	75-80
Daily rotation	65-75
Rotation every two days	60-70
Rotation every three days	55-60
3 to 7 day rotation	50-55
3 to 5 week rotation	30-50
Continuous grazing	20-40

^{1/} These values should be used only as a guide. Considerable variation can exist within and among categories. The terms "harvest efficiency" and "utilization rate" are often used interchangeably.

TABLE 3: Forage Crops and Prescribed Grazing Heights

Forage Crop	Height to Begin Grazing(inches)	Height to End Grazing (inches)
COOL SEASON GRASSES		
Annual Ryegrass	6 to 12	2 to 3
Bluegrass	4 to 6	1.5 to 2
Oats	8 to 12	3 to 4
Orchardgrass	8 to 10	3 to 4
Timothy	6 to 8	3 to 4
Reed Canarygrass	8 to 10	3 to 4
Tall Fescue	4 to 10	2 to 3
WARM SEASON GRASSES		
Bermudagrass	4 to 8	1 to 2
Big Bluestem	15 to 20	10 to 12
Indiangrass	12 to 16	6 to 10
Pearl Millet	12 to 24	8 to 10

Forage Crop	Height to Begin Grazing(inches)	Height to End Grazing (inches)
Sudangrass	20 to 24	8 to 12
Eastern gamagrass	18 to 22	10 to 12
Switchgrass	18 to 22	8 to 12
LEGUMES		
Alfalfa	10 to 16	3 to 4
Alsike Clover	8 to 10	3 to 4
Birdsfoot Trefoil	6 to 8	3 to 4
Crimson Clover	8 to 10	3 to 4
Hairy Vetch	6 to 8	3 to 4
Ladino Clover	6 to 8	3 to 4
Kobe Lespedeza	6 to 8	3 to 4
Korean Lespedeza	6 to 8	3 to 4
Sericea Lespedeza	8 to 15	3 to 4
Red Clover	8 to 10	3 to 4
Sweet Clover	6 to 8	3 to 4
Common White clover	4 to 6	1 to 2

Note: Grass/Legume mixes will be grazed according to the height prescribed for the dominant species. At outset of the grazing season, begin grazing perennial grasses at slightly shorter heights than the lowest one listed under Height to Begin Grazing column to stage pasture growth. Upper values of Height to Begin Grazing are the maximum for good forage quality. If height is exceeded, a haycrop cutting is a better option. In any case, if grass is in the boot stage or legume is in full bloom regardless of height, a haycrop cutting is a better option unless acreage in that stage of maturity is too small to be worth the effort. Note: Information for tables 1, 2, and 3 was compiled from Kentucky GLA software, Southern Forages Handbook, and University of Kentucky College of Agriculture sources and publications.

Additional Criteria to Improve or Maintain Quantity and Quality of Forage for Animal Health and/or Productivity

Plan grazing and/or browsing to match forage quantity and/or quality goals of the producer within the capability of the resource to respond to management.

Enhance diversity of rangeland and pasture plants to optimize delivery of nutrients to the animals by planning intensity, frequency, timing, and duration of grazing and/or browsing.

Plan intensity, frequency, timing, and duration of grazing and/or browsing to reduce animal stress and mortality from toxic and/or poisonous plants.

Provide supplemental feed and/or minerals as needed to balance with forage consumption to meet the desired nutritional level for the kind and class of grazing and/or browsing livestock.

Base the dietary needs of livestock on the National Research Council's Nutrient Requirements of Domestic Animals or similar scientific sources with appropriate adjustments made for increased energy demand required by browsing or grazing animals foraging for food including travel to and from grazing/browsing area.

Additional Criteria to Improve or Maintain Surface and/or Subsurface Water Quality and/or Quantity

Minimize concentrated livestock areas to enhance nutrient distribution and improve or maintain ground cover.

Manage intensity, frequency, timing, and duration of grazing, browsing and/or feeding to—

- Minimize deposition or flow of animal wastes into water bodies.
- Minimize animal impacts on stream bank or shoreline stability.
- Maintain or improve hydrologic function including infiltration and/or filtering capacity and soil surface stability to reduce runoff by providing adequate ground cover, plant spacing, and plant density.

Additional Criteria to Improve or Maintain Riparian and/or Watershed Function

Minimize concentrated livestock areas to improve or maintain riparian/floodplain plant community structure and functions.

Plan intensity, frequency, timing and duration of grazing and/or browsing to—

- Provide adequate ground cover and plant density to maintain or improve infiltration capacity and reduce runoff.
- Provide optimum ground cover, plant density, and/or plant structure to maintain or improve filtering capacity of the vegetation.
- Maintain adequate riparian community structure and function to sustain associated riparian, wetland, floodplain, and stream species.

Additional Criteria to Reduce Soil Erosion and Maintain or Improve Soil Health

Minimize concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff and erosion, and maintain soil organic matter.

Plan intensity, frequency, timing, and duration of grazing and/or browsing to provide adequate ground cover, litter, and canopy to maintain or improve infiltration.

Additional Criteria to Improve or Maintain Food and/or Cover for Fish and/or Wildlife Species of Concern

Identify species of concern in the objectives of the prescribed grazing plan.

Plan intensity, frequency, timing, and duration of grazing and/or browsing to provide for the development and maintenance of the plant structure, density, and diversity needed for the habitat requirements of the desired fish and wildlife species of concern.

Refer to the KY Wildlife Habitat Evaluation Procedure (KWHEP) and the conservation practice standard 645 Upland Wildlife Habitat Management for determining when grazing strategies may be appropriate.

Provide rest from grazing during critical nesting periods.

For pollinator habitat refer to the Kentucky Pollinator Handbook for grazing strategies (i.e. flash grazing) that may enhance or maintain forb stands designed to support pollinator habitat. This practice may be utilized as an O&M practice to maintain well established stands of pollinator habitat.

Note that some forb species used in pollinator plantings may not be suitable for grazing and can be toxic to livestock.

Flash grazing or long rotation periods can create disturbance regimes and assist in maintaining early successional habitat and associated flowering plants. For pollinator habitat disturbance regimes, flash grazing should have long rotation periods and should be performed no more frequently than every two to

three years. Timing and intensity of flash grazing should be based on the carrying capacity and number of animals including the size of the area.

Additional Criteria for Management of Fine Fuel Load

Plan intensity, frequency, timing, and duration of grazing and/or browsing to manage fuel continuity and loading to reduce wildfire hazard and/or facilitate desired conditions for prescribed burns.

CONSIDERATIONS

Protect soil, water, air, plant, and animal resources when locating livestock feeding, supplementation, handling, and watering facilities.

Design and install livestock feeding, handling, and watering facilities in a manner to improve and/or maintain animal distribution. Design and install facilities to minimize stress, the spread of disease, parasites, contact with harmful organisms, and toxic plants.

Utilization, stubble height, and other target levels are tools that can be used in conjunction with monitoring to help ensure that resource conservation and producer objectives are met. Refer to Guide to Pasture Condition Scoring and National Pasture Condition Score Sheet.

Where practical and beneficial, start the grazing sequence in a different management unit each growing season.

When weeds are a significant problem prescribed grazing and/or browsing should be implemented in conjunction with other pest management practices to promote plant community resistance to invasive species and protect desired plant communities.

Prescribed grazing should consider the needs of other enterprises utilizing the same land, such as wildlife and recreational uses.

Develop alternatives that minimize additional grazing management infrastructure while still achieving plan objectives for the desired fish and wildlife species of concern.

Provide deferment or rest from grazing or browsing as necessary to ensure the success of prescribed fire, brush management, seeding, or other conservation practices to prevent stress or damage to key plants

Use drought forecasting tools and soil water forecasts where available to promote the accuracy of forage production projections.

Improve carbon sequestration in biomass and soils through management of grazing and/or browsing to produce the desired results.

Plan biosecurity safeguards to prevent the spread of disease between on-farm or ranch classes of livestock and between livestock farm or ranch units.

Provide shelter in the form of windbreaks, sheds, shade structures, and other protective features where conditions warrant to protect livestock from severe weather, intense heat/humidity, and predators.

If nutrients are being applied, CPS Nutrient Management (Code 590) will be applied.

Maintain conservative stocking rates as a drought contingency strategy to minimize detrimental consequences during drought on economic and ecological sustainability.

PLANS AND SPECIFICATIONS

Prepare a prescribed grazing plan for all planned conservation management units where grazing and/or browsing will occur according to State standards and specifications.

Prescribed grazing plan will include—

- Goals and objectives clearly stated.
- Resource inventory that identifies—
 - Existing resource conditions and concerns.
 - Ecological site or forage suitability group.
 - Opportunities to enhance resource conditions.
 - Location and condition of structural improvements such as fences, water developments, etc., including seasonal availability and quality of watering sites.
- Forage inventory of the expected forage quality, quantity, and species in each management unit(s).
- Forage-animal balance developed for the grazing plan that ensures forage produced or available meets forage demand of livestock and/or wildlife.
- Grazing plan developed for livestock that identifies periods of grazing and/or browsing, deferment, rest, and/or other treatment activities for each management unit that accommodates the flexibility needed for adaptive management decisions as supported by the contingency plan and monitoring plan in order to meet goals and objectives.
- Contingency plan developed that details potential problems (i.e., drought, flooding, and insects) and serves as a guide for adaptive management decisions in grazing prescription adjustments in order to mitigate resource and economic effects.
- Monitoring plan developed with appropriate protocols and records that assess whether the grazing strategy is resulting in a movement toward meeting goals and objectives. Short-term and long-term monitoring may be needed to determine outcomes and support timely adaptive management decisions. Identify the key areas, key plants, or other monitoring indicators that the manager should evaluate in making grazing management decisions.
- Wildlife Habitat Narrative outlines the considerations made for wildlife species of concern including pollinators.

OPERATION AND MAINTENANCE

Operation

Prescribed grazing will be applied on a continuing basis throughout the livestock occupation period of all planned grazing units.

Adaptive management decisions will be made as needed and documented within the plan to ensure that the goals and objectives of the prescribed grazing strategy are met.

Adequate stubble heights for maintaining a productive and desirable forage plant community will be utilized on the majority of all pastureland throughout the occupation period of grazing units.

A producer may need to graze one pasture close (sacrifice one paddock) to protect other pastures from being overgrazed, to aid in maintenance of legumes, to control weeds, or provide high quality forage at a later date. However, at any one time, no more than 20 percent of the total grazing acreage should be grazed lower than the heights listed to end grazing (table 3). Management adjustments will be made as needed to ensure that the goals and objectives of the prescribed grazing strategy are met.

Options to protect forage heights include, but are not limited to:

A) Move or rotate livestock to another pasture or paddock. B) Feeding hay or other supplemental feed. C) Reducing the number of animals. D) Leasing additional pasture E) Fertilizing when moisture is available or seeding annuals, etc. F) Strategic confinement

Maintenance

Monitoring data and grazing records will be used on a regular basis within the prescribed grazing plan to ensure that objectives are being met, or to make necessary changes in the prescribed grazing plan to meet objectives.

All facilitating and accelerating conservation practices [e.g., Fence (Code 382), Pest Management (Code 595), Brush Management (Code 314), Forage and Biomass Planting (Code 512), Pipeline (Code 516), Watering Facility (Code 614), etc.], that are needed to effect adequate grazing and/or browsing distribution as planned by this practice standard will be maintained in good working order and operated as intended.

REFERENCES

Barnes, R.F., D.A. Miller, and C.J. Nelson. 1995. Forages, The Science of Grassland Agriculture, 5th Ed. Iowa State University Press, Ames, Iowa.

Bedunah, D.J. and R. E. Sosebee, Editors. 1995. Wildland Plants. Physiological Ecology and Developmental Morphology. Society for Range Management, Denver, Colorado.

Briske, D.D. editor. {2011}. Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps. U.S. Department of Agriculture, Natural Resources Conservation Service.

Follet, R.F., J.M. Kimble, and R. Lal. 2001 The Potential of U.S. Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect. Lewis Publishers, Boca Raton, Florida.

Heitschmidt, R.K. and J.W. Stuth eds. 1991. Grazing Management an Ecological Perspective. Timber Press.

Herrick, Jeffrey E., et. al. 2005. Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems, Volumes I and II. USDA-ARS Jornada Experimental Range. Las Cruces, New Mexico.

Hodgson, J. and A.W. Illius. Editors. 1996. Ecology and Management of Grazing Systems. CABI, Wellingford, United Kingdom.

Holechek, J.L., R.D. Pieper, and C. H. Herbel. 2000. Range management principles and practices. 5th edition. Prentice Hall, New Jersey.

National Research Council, 1981. Effect of Environment on Nutrient Requirements of Domestic Animals. National Academy Press. Washington, D.C.

National Research Council, Nutrient Requirement Series, Nutrient Requirements of Domestic Animals. National Academy Press. Washington, D.C.

Nelson, C. Jerry, editor. {2012}. Conservation Outcomes from Pastureland and Hayland Practices: Assessment, Recommendations and Knowledge Gaps. Allen Press, Lawrence, Kansas.

National Drought Mitigation Center, Vegetation Drought Response Index, <http://vegdr.unl.edu/>.

National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center, <http://www.cpc.noaa.gov/index.php>. Oates, Lawrence G. and Jackson, Randall D. 2014 Livestock Management Strategy Affects Net Ecosystem Carbon Balance of Subhumid Pasture, Rangeland Ecology and Management 67:19–29.

Roche, L.M, Cutts, B.B., Derner, J.D., Lubell, M.N., Tate, K.W., On-Ranch Grazing Strategies: Context for the Rotational Grazing Dilemma, Rangeland Ecology And Management 68 (2015) 248-256.

Sanderson, M.A., Skinner, R.H., Barker, D.J., Edwards, G.R., & al, e. (2004). Plant species diversity and management of temperate forage and grazing land ecosystems. *Crop Science*, 44(4), 1132-1144.

Smith, D., R.J. Bula, and R.P. Walgenbach. 1986. Forage Management 5th ed. Kendall/Hunt Publ. Co. Dubuque, Iowa.

Spaeth, K., M. Weltz, D.D. Briske, L.W. Jolley, L.J. Metz, and C. Rossi, (2013). Rangeland CEAP: An assessment of natural resources conservation service practices. *Rangelands*, 35(1), 2-10.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2003. National Range and Pasture Handbook. Washington, D.C.

U.S. Drought Monitor, <http://droughtmonitor.unl.edu/>.

Vallentine, J.F. 2001. Grazing management. Academic Press, San Diego, California.

Vegetation Drought Response Index (<http://vegdri.unl.edu/>)